

1. A hologram made by exposing an interference pattern inside a polymer-dispersed liquid crystal material, the polymer-dispersed liquid crystal material comprising, before exposure:

(a) a polymerizable monomer comprising a plurality of acrylates;

(b) a liquid crystal;

(c) a cross-linking monomer;

(d) a coinitiator; and

(e) a photoinitiator dye.

2. The hologram according to claim 1, wherein the polymerizable monomer further comprises tri-acrylates and pentaacrylates.

3. The hologram according to claim 2, wherein the polymerizable monomer further comprises tri-acrylates and pentaacrylates in a ratio of about 1 to 4.

4. The hologram according to claim 1, wherein the polymerizable monomer further comprises di-acrylates, triacrylates, and penta-acrylates.

5. The hologram according to claim 1, wherein the polymerizable monomer further comprises triethyleneglycol diacrylate.

6. The hologram according to claim 1, wherein the polymerizable monomer further comprises trimethylolpropane triacrylate.

7. The hologram according to claim 1, wherein the polymerizable monomer further comprises pentaerythritol triacrylate.

8. The hologram according to claim 1, wherein the polymerizable monomer further comprises pentaerythritol tetracrylate.

9. The hologram according to claim 1, wherein the polymerizable monomer further comprises pentaerythritol pentacrylate.

10. A hologram made by exposing an interference pattern inside a polymer-dispersed liquid crystal material, the polymer-dispersed liquid crystal material comprising, before exposure:

- (a) a polymerizable monomer;
- (b) a liquid crystal comprising  $\alpha$ -methoxybenzylidene-4'-butylaniline;
- (c) a cross-linking monomer;
- (d) a coinitiator; and
- (e) a photoinitiator dye.

5 11. A hologram made by exposing an interference  
pattern inside a polymer-dispersed liquid crystal  
material, the polymer-dispersed liquid crystal  
material comprising, before exposure:

(a) a polymerizable monomer;

(b) a liquid crystal;

10 (c) a cross-linking monomer;

(d) a coinitiator; and

(e) a photoinitiator dye comprising 2,4,5,7-  
tetraiodo-3',4',5',6'-tetrachlorofluorescein-6-  
acetate ester.

12. A hologram made by exposing an interference  
pattern inside a polymer-dispersed liquid crystal  
material, the polymer-dispersed liquid crystal  
material comprising, before exposure:

5 (a) a polymerizable monomer;

(b) a liquid crystal;

(c) a cross-linking monomer;

(d) a coinitiator; and

10 (e) a photoinitiator dye selected from the  
group consisting of eosin, eosin sodium salt, 4,5-  
diiodosuccinyl fluorescein, camphorquinone and  
methylene blue.

13. A hologram made by exposing an interference pattern inside a polymer-dispersed liquid crystal material, the polymer-dispersed liquid crystal material comprising, before exposure:

- 5           (a) a polymerizable monomer;
- (b) a liquid crystal;
- (c) a cross-linking monomer;
- (d) a coinitiator; and
- 10          (e) a photoinitiator dye comprising a cationic cyanine dye.

14. A hologram made by exposing an interference pattern inside a polymer-dispersed liquid crystal material, the polymer-dispersed liquid crystal material comprising, before exposure:

- 5           (a) a polymerizable monomer;
- (b) a liquid crystal;
- (c) a cross-linking monomer;
- (d) a coinitiator; and
- 10          (e) a photoinitiator dye comprising a merocyanine dye.

15. A hologram made by exposing an interference pattern inside a polymer-dispersed liquid crystal material, the polymer-dispersed liquid crystal material comprising, before exposure:

- 5           (a) a polymerizable monomer;
- (b) a liquid crystal;
- (c) a cross-linking monomer;
- (d) a coinitiator comprising triethyl amine;
- and
- 10          (e) a photoinitiator dye.

16. A hologram made by exposing an interference pattern inside a polymer-dispersed liquid crystal material, the polymer-dispersed liquid crystal material comprising, before exposure:

- (a) a polymerizable monomer;
- (b) a liquid crystal;
- (c) a cross-linking monomer;
- (d) a coinitiator comprising triethanolamine;
- and
- (e) a photoinitiator dye.

17. A hologram made by exposing an interference pattern inside a polymer-dispersed liquid crystal material, the polymer-dispersed liquid crystal material comprising, before exposure:

- (a) a polymerizable monomer;
- (b) a liquid crystal;
- (c) a cross-linking monomer;
- (d) a coinitiator comprising N,N-dimethyl-2,6-diisopropyl aniline; and
- (e) a photoinitiator dye.

5 18. A hologram made by exposing an interference pattern inside a polymer-dispersed liquid crystal material, the polymer-dispersed liquid crystal material comprising, before exposure:

- (a) a polymerizable monomer;
- (b) a liquid crystal;
- (c) a cross-linking monomer;
- (d) a coinitiator comprising an organic
- 10 borate; and
- (e) a photoinitiator dye.

19. The hologram according to claim 18, wherein the coinitiator further comprises trialkyl borate.

20. The hologram according to claim 18, wherein the coinitiator further comprises triphenyl borate.

5 21. The hologram according to claim 18, wherein the polymer-dispersed liquid crystal material further comprises, before exposure, about 0.2% by weight to 0.4% by weight of photoinitiator dye and about 2% by weight to 3% by weight of coinitiator.

22. The hologram of claim 16, wherein the photoinitiator dye comprises eosin.

23. The hologram of claim 16, wherein the photoinitiator dye comprises fluorescein.

24. The hologram of claim 16, wherein the photoinitiator dye comprises methylene blue.

25. The hologram of claim 16, wherein the photoinitiator dye comprises erythrosin B.

26. A hologram made by exposing an interference pattern inside a polymer-dispersed liquid crystal material, the polymer-dispersed liquid crystal material comprising, before exposure:

- (a) a polymerizable monomer;
- (b) a liquid crystal;
- (c) a cross-linking monomer;
- (d) a coinitiator comprising triphenyl borate;

and

(e) a photoinitiator dye comprising indolinocarbocyanine.

27. A hologram made by exposing an interference pattern inside a polymer-dispersed liquid crystal material, the polymer-dispersed liquid crystal material comprising, before exposure:

- (a) a polymerizable monomer;
- (b) a liquid crystal;
- (c) a cross-linking monomer;
- (d) a coinitiator comprising triethylamine;

and

(e) a photoinitiator dye comprising iodobenzospiropyran.

28. A hologram made by exposing an interference pattern inside a polymer-dispersed liquid crystal material, the polymer-dispersed liquid crystal material comprising, before exposure:

- (a) a polymerizable monomer;
- (b) a liquid crystal;
- (c) a cross-linking monomer;
- (d) a coinitiator comprising trialkylborate;

and

(e) a photoinitiator dye comprising a cationic cyanine dye.



29. A hologram made by exposing an interference pattern inside a polymer-dispersed liquid crystal material, the polymer-dispersed liquid crystal material comprising, before exposure:

- (a) a polymerizable monomer;
- (b) a liquid crystal;
- (c) a cross-linking monomer comprising N-vinyl pyridine;
- (d) a coinitiator; and
- (e) a photoinitiator dye.

30. A hologram made by exposing an interference pattern inside a polymer-dispersed liquid crystal material, the polymer-dispersed liquid crystal material comprising, before exposure:

- (a) a polymerizable monomer;
- (b) a liquid crystal;
- (c) a cross-linking monomer comprising acrylonitrile;
- (d) a coinitiator; and
- (e) a photoinitiator dye.

31. A hologram made by exposing an interference pattern inside a polymer-dispersed liquid crystal material, the polymer-dispersed liquid crystal material comprising, before exposure:

- (a) a polymerizable monomer;
- (b) a liquid crystal;
- (c) a cross-linking monomer comprising N-vinyl carbazole;
- (d) a coinitiator; and
- (e) a photoinitiator dye.

32. A hologram made by exposing an interference pattern inside a polymer-dispersed liquid crystal material, the polymer-dispersed liquid crystal material comprising, before exposure:

- (a) a polymerizable monomer;
- (b) a liquid crystal;
- (c) a cross-linking monomer;
- (d) a coinitiator;
- (e) a photoinitiator dye; and
- (f) a surfactant selected from the group consisting of heptanoic acid, hexanoic acid, dodecanoic acid, and decanoic acid.

33. A hologram made by exposing an interference pattern inside a polymer-dispersed liquid crystal material, the polymer-dispersed liquid crystal material comprising, before exposure:

- (a) a polymerizable monomer;
- (b) vinyl neononanoate;
- (c) a liquid crystal;
- (d) a coinitiator; and
- (e) a photoinitiator dye.

34. The hologram of claim 33, wherein the polymer-dispersed liquid crystal material comprises, before exposure, about 6.5% by weight vinyl neononanoate.

35. The hologram of claim 33, wherein the polymerizable monomer comprises dipentaerythritol hydroxypentaacrylate.

36. A hologram made by exposing an interference pattern inside a polymer-dispersed liquid crystal material, the polymer-dispersed liquid crystal material comprising, before exposure:

- (a) a polymerizable liquid crystal monomer;
- (b) a liquid crystal;
- (c) a coinitiator; and
- (d) a photoinitiator dye.

37. The hologram of claim 36, wherein the liquid crystal monomer comprises  $\text{CH}_2=\text{CH}-\text{COO}-(\text{CH}_2)_6\text{O}-\text{C}_6\text{H}_5-\text{C}_6\text{H}_5-\text{COO}-\text{CH}=\text{CH}_2$ .

38. The hologram of claim 36, wherein the liquid crystal monomer comprises  $\text{CH}_2-\text{CH}-(\text{CH}_2)_8-\text{COO}-\text{C}_6\text{H}_5-\text{COO}-(\text{CH}_2)_8-\text{CH}=\text{CH}_2$ .

39. The hologram of claim 36, wherein the liquid crystal monomer comprises  $\text{H}(\text{CF}_2)_{10}\text{CH}_2\text{O}-\text{CH}_2-\text{C}(=\text{CH}_2)-\text{CO}_3-(\text{CH}_2\text{CH}_2\text{O})_3\text{CH}_2\text{CH}_2\text{O}-\text{COO}-\text{CH}_2-\text{C}(=\text{CH}_2)-\text{CH}_2\text{O}(\text{CF}_2)_{10}\text{H}$ .

40. A hologram made by exposing an interference pattern inside a polymer-dispersed liquid crystal material, the polymer-dispersed liquid crystal material comprising, before exposure:

(a) a polymerizable semifluorinated acrylate monomer;

(b) a liquid crystal;

(c) a coinitiator; and

(d) a photoinitiator dye.